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Mazdoor Kisan Shakti Sangathan

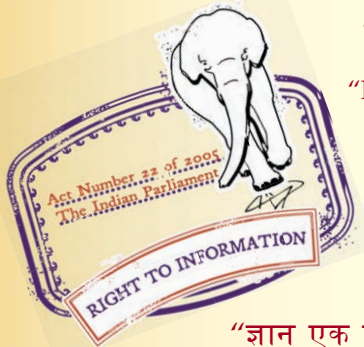
“The Right to Information, The Right to Live”

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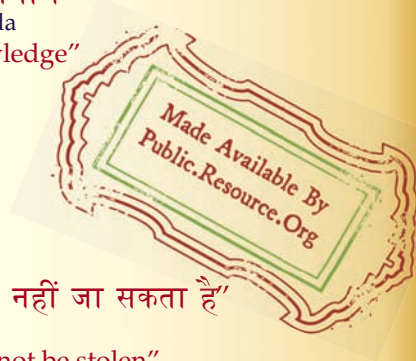
IS 14404 (1996): Process Equipment - Recommendations on Design Pressure and Temperature [MED 17: Chemical Engineering Plants and Related Equipment]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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IS 14404 : 1996
(Amalgamating IS 2845 : 1964
and IS 2846 : 1964)

भारतीय मानक
प्रक्रमण उपस्कर — डिजाइन प्रेशर
व तापमान पर सिफारिशें

Indian Standard

PROCESS EQUIPMENT — RECOMMENDATIONS
ON DESIGN PRESSURE AND TEMPERATURE

ICS 71.120

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Chemical Engineering Plants and Related Equipment Sectional Committee had been approved by the Heavy Mechanical Engineering Division Council.

IS 2845:1964 'Recommendation on nominal pressures for process equipment' and IS 2846:1964 'Recommendation on nominal temperatures for process equipment' were published in 1964. It has been considered essential to amalgamate these standards and to bring them in line with the latest practice being followed in the country in the fabrication and use of process equipment. As a result this standard has been formulated to amalgamate these standards.

IS 2845:1964 and IS 2846:1964 were defining 'nominal pressure' and 'nominal temperature' respectively giving their values in tabular form. This standard is now defining 'design pressure' and 'design temperature' and giving recommendations on criteria for their determination. After publication of this standard IS 2845 and IS 2846 would be withdrawn.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PROCESS EQUIPMENT — RECOMMENDATIONS ON DESIGN PRESSURE AND TEMPERATURE

1 SCOPE

1.1 This standard lays down the recommendations on determination of design pressures/design temperature to be used in the designation of chemical equipment.

1.1.1 This standard is not applicable for jacketed vessels.

2 TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Design Pressure

The pressure (internal or external), including static head, used in the design calculations of a vessel for the purpose of determining the minimum thickness of the various component parts of the vessel.

2.2 Design Temperature

The temperature used in the design calculations for adopting the maximum permissible stress value of the vessel material for the purpose of determining the minimum thickness of the various component parts of the vessel.

3 DETERMINATION OF DESIGN PRESSURE/DESIGN TEMPERATURE

3.1 Determination of Design Pressure

For determining the design pressure of a vessel, following criteria shall apply:

- a) Vessels protected by safety relief valves shall be designed for an internal pressure that exceeds maximum specified operating pressure by 10 percent or 0.2 MPa ($\approx 2 \text{ kgf/cm}^2$) whichever is more.
- b) All hydrocarbon vessels connected to flare system shall be designed for minimum pressure of 0.35 MPa ($\approx 3.5 \text{ kgf/cm}^2$). This pressure is based on assumption that minimum back pressure at safety valve shall be 0.175 MPa ($\approx 1.75 \text{ kgf/cm}^2$) for relieving hydrocarbons to elevated flare. In case, lower back pressure is acceptable, design pressure of vessel can be decreased if economically justified. However, design pressure shall be minimum 10 percent more than maximum specified operating pressure of vessel.
- c) Vessels without pressure relieving devices shall be provided with an outlet (vent for liquid service) which cannot be completely

blocked off. The minimum outlet opening shall be sized so that the maximum pressure which can be developed in the vessel is not greater than the design pressure.

- d) All vessels containing liquids having vapour pressure at minimum ambient temperature lower than atmospheric pressure shall be designed for full vacuum.
- e) Vessels open to atmosphere shall be designed for pressure due to hydrostatic head of the vessel.
- f) Vessels where vacuum conditions are possible during operation shall be designed to withstand FULL VACUUM.

3.2 Determination of Design Temperature

For determining the design temperature of the vessel following criteria shall apply:

- a) The design temperature for vessels shall be equal to maximum operating temperature of fluid in the vessel plus 15°C subject to minimum of 65°C. For vessels operating at temperature below -29°C, the design temperature shall be the lowest operating temperature.
- b) The vessels provided with steam flushing connection shall be designed for a minimum temperature equivalent to flushing steam operating temperature.
- c) Vessels provided with drying air/gas connection shall be designed for operating temperature of drying air/gas plus 15°C.
- d) For the pressure vessels storing liquefied hydrocarbons at ambient/sub-ambient temperature, the lowest design temperature shall correspond to 40 percent depressurisation pressure (that is, 0.4 times pressure). However, for vessels, where possibility of complete depressurisation exists coincident temperature corresponding to atmospheric pressure shall be considered.

NOTE — Vessels shall have two sets of design pressure/temperature conditions in accordance with 3.2(d).

- e) The minimum metal temperature used in design shall be the lowest expected in service considering the lowest operating temperature, operational upsets, atmospheric temperature, etc.

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